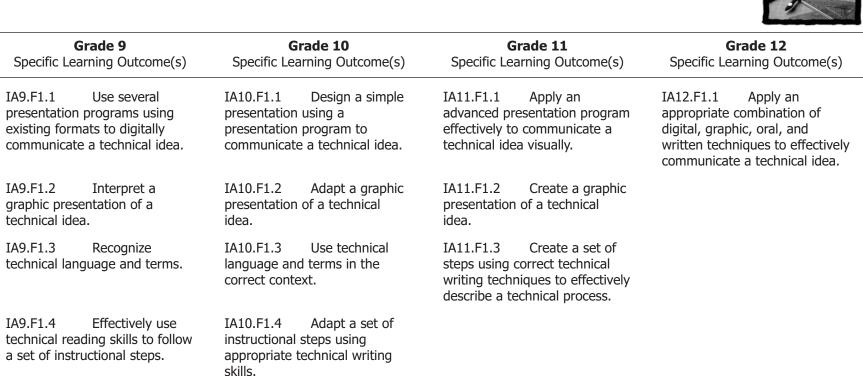# SENIOR YEARS

Drafting Design Technology

Fundamental Skills

General Learning Outcome

GLO F1 **Technical Communication:** Communicate technical ideas and designs effectively and appropriately.

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.F1.1 Use several presentation programs using existing formats to digitally communicate a technical idea.	IA10.F1.1 Design a simple presentation using a presentation program to communicate a technical idea.	IA11.F1.1 Apply an advanced presentation program effectively to communicate a technical idea visually.	IA12.F1.1 Apply an appropriate combination of digital, graphic, oral, and written techniques to effectively communicate a technical idea.
IA9.F1.2 Interpret a graphic presentation of a technical idea.	IA10.F1.2 Adapt a graphic presentation of a technical idea.	IA11.F1.2 Create a graphic presentation of a technical idea.	
IA9.F1.3 Recognize technical language and terms.	IA10.F1.3 Use technical language and terms in the correct context.	IA11.F1.3 Create a set of steps using correct technical writing techniques to effectively describe a technical process.	
IA9.F1.4 Effectively use technical reading skills to follow a set of instructional steps.	IA10.F1.4 Adapt a set of instructional steps using appropriate technical writing skills.		

Fundamental Skills

General Learning Outcome

GLO F2 **Problem Solving:** Apply effective decision-making, problem-solving, and design strategies to a project. (Refer to Appendix B for a sample design/problem-solving process.)

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.F2.1 Demonstrate an understanding of the problem-solving process in designing and producing a product.	IA10.F2.1 Identify problems and apply appropriate problem-solving skills to solve them.	IA11.F2.1 Transfer problem-solving skills to real-life situations.	IA12.F2.1 Research and articulate a problem that can be solved through technological means.
IA9.F2.2 Identify criteria for making and evaluating choices.	IA10.F2.2 Apply a decision-making strategy to practical situations.	IA11.F2.2 Use a variety of critical thinking skills to evaluate situations and make decisions.	IA12.F2.2 Apply problem-solving and design skills to develop a technological solution to a problem.
IA9.F2.3 Demonstrate an understanding of the qualities of good design.	IA10.F2.3 Modify an existing design to meet specified criteria.	IA11.F2.3 Create a design to meet a set of specifications.	IA12.F2.3 Analyze critically and act logically to evaluate situations and make decisions.

Fundamental Skills

General Learning Outcome

GLO F3   **Information Management:** Effectively manage information.

Grade 9 Specific Learning Outcome(s)	**Grade 10** Specific Learning Outcome(s)	**Grade 11** Specific Learning Outcome(s)	**Grade 12** Specific Learning Outcome(s)
IA9.F3.1 Acquire and organize information using appropriate technology and information systems.	IA10.F3.1 Apply specialized information and skills in real-life situations.	IA11.F3.1 Transfer and apply specialized information and skills in a variety of situations.	IA12.F3.1 Acquire, analyze, and apply specialized information and skills from various disciplines in a variety of realistic circumstances.
IA9.F3.2 Demonstrate the appropriate use of information as directed.	IA10.F3.2 Access and use a range of relevant information, material, and human resources with limited direction.	IA11.F3.2 Acquire and use a range of relevant information, material, and human resources, and recognize when additional resources are required.	IA12.F3.2 Support and enhance basic information requirements by using a wide variety of information, material, and human resources.

Personal Skills

General Learning Outcome

GLO P1   **Time Management:** Demonstrate responsibility in time management, task completion, and in meeting project criteria. (Note: based on the Conference Board of Canada's Personal Management Skills)

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.P1.1 Demonstrate responsibility in time management.	IA10.P1.1 Demonstrate responsibility in time management.	IA11.P1.1 Demonstrate responsibility in time management.	IA12.P1.1 Demonstrate responsibility in time management.
IA9.P1.2 Demonstrate responsibility in being accountable for one's actions.	IA10.P1.2 Demonstrate responsibility in being accountable for one's actions.	IA11.P1.2 Demonstrate responsibility in being accountable for one's actions.	IA12.P1.2 Demonstrate responsibility in being accountable for one's actions.
IA9.P1.3 Arrive at class prepared with materials and completed assignments.	IA10.P1.3 Arrive at class prepared with materials and completed assignments.	IA11.P1.3 Arrive at class prepared with materials and completed assignments.	IA12.P1.3 Arrive at class prepared with materials and completed assignments.
IA9.P1.4 Complete all assigned tasks within stated deadlines.	IA10.P1.4 Complete all assigned tasks within stated deadlines.	IA11.P1.4 Complete all assigned tasks within stated deadlines.	IA12.P1.4 Complete all assigned tasks within stated deadlines.
IA9.P1.5 Complete all projects according to specified criteria.	IA10.P1.5 Complete all projects according to specified criteria.	IA11.P1.5 Complete all projects according to specified criteria.	IA12.P1.5 Complete all projects according to specified criteria.

Personal Skills

General Learning Outcome

GLO P2   **Ethical Decision Making:** Make ethical decisions concerning the impact of one's activities and the use of technology.

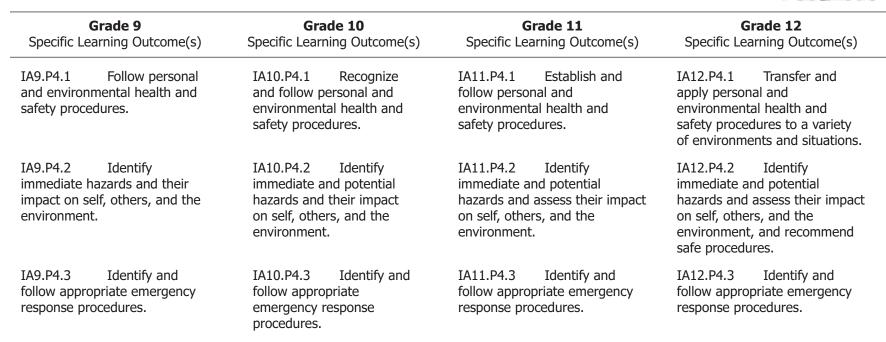| Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.P2.1 Make personal judgments whether certain behaviours/actions are right or wrong.	IA10.P2.1 Assess how personal judgments affect peer members and/or community members.	IA11.P2.1 Assess the implications of personal/group actions within the broader community.	IA12.P2.1 Analyze the implications of personal/group actions within the global context.
IA9.P2.2 Demonstrate an understanding of technological impact on the environment, society, lifestyles, etc.	IA10.P2.2 Demonstrate an understanding of the impact of technological choices.	IA11.P2.2 Develop and implement risk management strategies for a variety of technological activities.	IA12.P2.2 State and support a personal code of ethics as required.
			IA12.P2.3 Demonstrate responsible leadership in managing current and future technologies on the environment and on society.

Personal Skills

General Learning Outcome

GLO P3   **Career Planning:** Develop an action plan relating personal aptitudes and abilities to occupational opportunities.

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.P3.1 Identify critical skills needed for employability in today's workplace.	IA10.P3.1 Evaluate employability profiles for a variety of workplaces and careers.	IA11.P3.1 Develop strategies to assess personal technological literacy and capability.	IA12.P3.1 Assess specific personal skills, interests, and abilities (career portfolio).
IA9.P3.2 Demonstrate an awareness of the technologies of specific occupations and workplaces.	IA10.P3.2 Outline skills required for a specific career path.	IA11.P3.2 Perform an assessment of personal strengths and weaknesses (career portfolio).	IA12.P3.2 Develop a plan for acquiring the technological capabilities required to achieve a career vision (career portfolio).

Personal Skills

General Learning Outcome

GLO P4 **Safe Practices:** Demonstrate safe practices with tools, machines, materials, and related processes.
(Refer to: *Keeping Your Facilities SAFE: A Support Document for Industrial Arts Teachers,* Manitoba Education and Youth, 2003.)

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.P4.1 Follow personal and environmental health and safety procedures.	IA10.P4.1 Recognize and follow personal and environmental health and safety procedures.	IA11.P4.1 Establish and follow personal and environmental health and safety procedures.	IA12.P4.1 Transfer and apply personal and environmental health and safety procedures to a variety of environments and situations.
IA9.P4.2 Identify immediate hazards and their impact on self, others, and the environment.	IA10.P4.2 Identify immediate and potential hazards and their impact on self, others, and the environment.	IA11.P4.2 Identify immediate and potential hazards and assess their impact on self, others, and the environment.	IA12.P4.2 Identify immediate and potential hazards and assess their impact on self, others, and the environment, and recommend safe procedures.
IA9.P4.3 Identify and follow appropriate emergency response procedures.	IA10.P4.3 Identify and follow appropriate emergency response procedures.	IA11.P4.3 Identify and follow appropriate emergency response procedures.	IA12.P4.3 Identify and follow appropriate emergency response procedures.

Personal Skills

General Learning Outcome

GLO P5   **Positive Attitude:** Demonstrate positive attitudes to learning in Industrial Arts facilities.

Grade 9 Specific Learning Outcome(s)	**Grade 10** Specific Learning Outcome(s)	**Grade 11** Specific Learning Outcome(s)	**Grade 12** Specific Learning Outcome(s)
IA9.P5.1 Listen, in order to understand and learn.	IA10.P5.1 Listen and respond, in order to understand and learn.	IA11.P5.1 Listen and respond, in order to understand, learn, and teach.	IA12.P5.1 Listen and respond, in order to understand, learn, teach, and evaluate.
IA9.P5.2 Demonstrate a willingness to continuously learn.	IA10.P5.2 Assess personal learning needs (i.e., personal learning style).	IA11.P5.2 Identify learning sources and opportunities.	IA12.P5.2 Set learning goals and develop a personal learning plan.
IA9.P5.3 Actively participate in a positive manner.	IA10.P5.3 Actively participate in a positive manner.	IA11.P5.3 Actively participate in a positive manner.	IA12.P5.3 Actively participate in a positive manner.

Personal Skills

General Learning Outcome

GLO P6   **Teamwork:** Adapt strategies to work effectively, independently, or as a team member to complete a project.

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.P6.1 Demonstrate an understanding of the role of members of a team.	IA10.P6.1 Contribute to a team to achieve its mandate.	IA11.P6.1 Identify the need to lead and/or support in a team situation, in order to achieve the team mandate.	IA12.P6.1 Understand and work with others on a "job" to achieve the best results.
IA9.P6.2 Acknowledge the opinions and contributions of all team members.	IA10.P6.2 Respect the opinions and contributions of all team members.	IA11.P6.2 Seek and appreciate the opinions and contributions of all team members.	IA12.P6.2 Lead and/or support as appropriate to motivate a team for high performance.
IA9.P6.3 List and define team objectives.	IA10.P6.3 Contribute to the development of team objectives and goals.	IA11.P6.3 ➔	IA12.P6.3 Develop and/or refine a team approach based on needs and benefits.

Production Skills

General Learning Outcome

GLO DD1   **Tools and Equipment:** Identify and demonstrate proper use of tools, materials, and equipment utilized in drafting design.

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.DD1.1 Identify and utilize traditional "board" tools used in drafting such as T-squares, drafting machines, set-squares, scales, rules...	IA10.DD1.1 →	IA11.DD1.1 →	IA12.DD1.1 →
IA9.DD1.2 Use a Computer Assisted Drafting and Design (CADD) system to produce a simple technical drawing.	IA10.DD1.2 →	IA11.DD1.2 →	IA12.DD1.2 Convert ideas into 2-D and 3-D drawings using a CADD system and rendering software.
IA9.DD1.3 Demonstrate a working knowledge of various input and output devices in a CADD system.	IA10.DD1.3 →	IA11.DD1.3 →	IA12.DD1.3 Determine hardware and software configuration required to accomplish goals in a specified drafting project.

Production Skills

General Learning Outcome

GLO DD2   **Drawing Interpretation:** Recognize and interpret technical drawings.

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.DD2.1 Do a "material take off" from a set of technical drawings.	IA10.DD2.1 Read and utilize information schedules and notations (including title blocks) on technical drawings.	IA11.DD2.1 ➔	IA12.DD2.1 ➔
IA9.DD2.2 Identify the main conventions related to simple technical drawings.	IA10.DD2.2 ➔	IA11.DD2.2 ➔	IA12.DD2.2 Identify the main conventions related to several types of technical drawings such as product manufacturing, architectural, civil/structural engineering, aeronautical engineering...

Production Skills

General Learning Outcome

GLO DD3   **Technical Sketching:** Employ technical sketching as a way of visualizing ideas.

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.DD3.1 Identify specialized technical sketching materials.	IA10.DD3.1 →	IA11.DD3.1 →	IA12.DD3.1 →
IA9.DD3.2 Sketch orthographic and pictorial views of common objects.	IA10.DD3.2 →	IA11.DD3.2 →	IA12.DD3.2 Employ sketching as a way of representing ideas during the planning of all drafting projects.

Production Skills

General Learning Outcome

GLO DD4   **Geometric Application:** Apply mathematics and geometry in completing technical drawings.

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.DD4.1 Identify basic geometric shapes and solids.	IA10.DD4.1 Construct basic geometric shapes and solids.	IA11.DD4.1 →	IA12.DD4.1 →
IA9.DD4.2 Recognize and interpret technical drawings containing auxiliary views and sections.	IA10.DD4.2 →	IA11.DD4.2 →	IA12.DD4.2 Identify the appropriate need for auxiliary views and sections in a technical drawing and create them.
IA9.DD4.3 Identify basic geometric developments.	IA10.DD4.3 →	IA11.DD4.3 →	IA12.DD4.3 Create parallel line and radial line developments with and without intersecting shapes.

Production Skills

General Learning Outcome

GLO DD5 **Production (Working) Drawings:** Use the design process and problem solving to create production drawings.

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.DD5.1 Identify the common terms and properties of typical mechanical production drawings such as tolerances, surface finish, threaded fastener specifications, welding symbols	IA10.DD5.1 →	IA11.DD5.1 →	IA12.DD5.1 Research, assemble information, and develop a solution by creating a mechanical production drawing.
IA9.DD5.2 Identify the common terms and properties of typical building construction drawings such as presentation drawings, construction drawings, plan views, elevations, finish schedules, perspective projection …	IA10.DD5.2 →	IA11.DD5.2 →	IA12.DD5.2 Research, assemble information, and develop a solution by creating a building construction drawing.
IA9.DD5.3 Identify the common terms and properties of typical electricity/electronics and piping fluidic drawings such as schematic symbols, pictorial connection diagrams, single line pipe diagrams …	IA10.DD5.3 →	IA11.DD5.3 →	IA12.DD5.3 Research, assemble information, and develop a solution by creating a electricity/electronics drawing.

Continued

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.DD5.4 Identify the common terms and properties of typical technical illustration/sales drawings such as shading, exploded pictorial, wash rendering, charting …	IA10.DD5.4 ➔	IA11.DD5.4 ➔	IA12.DD5.4 Research, assemble information, and develop a solution by creating a technical illustration/sales drawing.
IA9.DD5.5 Identify the common terms and properties of typical geological/ topographical drawings such as cadastral maps, plot survey, contour mapping …	IA10.DD5.5 ➔	IA11.DD5.5 ➔	IA12.DD5.5 Research, assemble information, and develop a solution by creating a geological/ topographical drawing.

Production Skills

General Learning Outcome

GLO DD6 **Applications:** Develop an understanding of drafting applications and current workplace practice.

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.DD6.1 Identify the common terms and practices associated with product manufacturing drafting such as detail working drawings, assembly drawings, scale models, and prototypes …	IA10.DD6.1 ➜	IA11.DD6.1 ➜	IA12.DD6.1 Combine knowledge of production drawings, good design process, and teamwork to create a series of drawings and models as a solution to a product manufacturing challenge.
IA9.DD6.2 Identify the common terms and practices associated with architectural drafting such as architectural lettering, architectural styles, house construction, architectural scale models …	IA10.DD6.2 ➜	IA11.DD6.2 ➜	IA12.DD6.2 Combine knowledge of production drawings, good design process, and teamwork to create a series of drawings as a solution to an architectural project challenge.
IA9.DD6.3 Identify the common terms and practices associated with engineering drafting such as community plans, surveys, steel structure cross sections, sheet metal, jigs, fixtures …	IA10.DD6.3 ➜	IA11.DD6.3 ➜	IA12.DD6.3 Combine knowledge of production drawings, good design process, and teamwork to create a series of drawings as a solution to an engineering project challenge.

Production Skills

General Learning Outcome

GLO DD7   **Current Innovation:** Demonstrate an understanding of current innovation in drafting design processes, applications, and emerging new technologies.

Grade 9 Specific Learning Outcome(s)	Grade 10 Specific Learning Outcome(s)	Grade 11 Specific Learning Outcome(s)	Grade 12 Specific Learning Outcome(s)
IA9.DD7.1 Identify several current innovations in drafting design such as virtual walkthrough software, 3-D prototype printing, 3-D solid modelling drafting …	IA10.DD7.1 ➔	IA11.DD7.1 ➔	IA12.DD7.1 Research, explain, and demonstrate several current innovations in drafting design.